# A BILLION GRAINS OF TRUTH: DISTRIBUTIONAL IMPACTS OF HOUSEHOLD-LEVEL CLIMATE CHANGE TAX SUBSIDIES IN THE UNITED STATES

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* Yale Law School, J.D. 2017. Yale School of Forestry and Environmental Studies, M.E.M. 2017. I am deeply grateful to Dan Esty, Anne Alstott, and Becca Lee for their feedback on various drafts of this article. I also thank the editors of the *Vermont Journal of Environmental Law*—especially Becca Blackmon and Beth Bootz—for their thoughtful edits and assistance.

*We know that the climate activists will fight for subsidies and supports for the booming clean energy and energy conservation markets. But will they insist that these new industries be accessible beyond the eco-elite—creating jobs and wealth-building opportunities for low-income people and people of color?*

- Van Jones, 2007[1]

## INTRODUCTION

As Van Jones presciently observed in 2007, over the past decade, climate activists fought for support for the clean-energy and energy-conservation markets.[2] Today, federal and state governments spend billions of dollars each year on renewable-energy, energy-efficiency, and alternative-vehicle tax incentives designed to encourage our transition to a low-carbon future.[3] Yet, how these tax incentives are structured has important distributional implications. Who can access these incentives? Are these incentives limited to wealthy elites? Or, are they equally accessible to all income groups?

As Van Jones alluded to in 2007, critics have long characterized environmentalism as a movement by and for wealthy, white communities.[4] This article adds grains of truth to critics' piles. By analyzing the structure of every federal and state renewable-energy, energy-efficiency, and alternative-vehicle tax incentive[5] in the United States—123 tax incentives in total—this article illustrates how United States climate-change tax

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1. Van Jones, *Beyond Eco-Apartheid: Is the Green Movement too White?*, EUROPE SOLIDAIRE SANS FRONTIÈRES (Apr. 2007), http://www.europe-solidaire.org/spip.php?article7478 [https://perma.cc/B8KW-64MY].

2. *Id.*

3. *See, e.g.*, DEP'T OF THE TREASURY, INTERNAL REVENUE SERV., REV. 08-2015, INDIVIDUAL INCOME TAX RETURNS 2013, at 142–43 (2015), https://www.irs.gov/pub/irs-soi/13inalcr.pdf [https://perma.cc/3UES-U9H5] [hereinafter INDIVIDUAL INCOME TAX RETURNS 2013] (finding that in 2013 alone the federal government spent over $1.8 billion on these incentives).

4. *See, e.g.*, Darryl Fears, *Within Mainstream Environmentalist Groups, Diversity Is Lacking*, WASH. POST (Mar. 24, 2013), https://www.washingtonpost.com/national/health-science/within-mainstream-environmentalist-groups-diversity-is-lacking/2013/03/24/c42664dc-9235-11e2-9cfd-36d6c9b5d7ad_story.html?utm_term=.3bf738638fd7 [https://perma.cc/DF5X-8CH8] (interviewing experts and minority members of the nation's largest environmental groups who state that the movement has taken too long to engage with minority communities and has a reputation for being wealthy and white).

5. I refer to these three collectively as "climate change" or "climate" tax incentives.

incentives favor wealthy households. This article goes on to argue that federal and state governments should reform current tax subsidies to refundable tax credits or other more progressive forms to better include all households in our efforts to achieve a clean-energy future. Doing so would increase the cost-effectiveness and economic efficiency of current climate-change tax subsidy programs, bring more people into the environmental movement, strengthen public support for other climate policies, and lessen income-inequality effects.

Tax policy matters. Over the past century, tax law has become the site of major social- and economic-policy decisions in the United States.[6] The United States, more than almost any other country, tends to regulate private conduct through the tax code.[7] The United States enacts regulatory policy through the tax code by offering incentives to buy certain products, donate to certain organizations, and engage in certain behaviors.[8] Housing policy, anti-poverty initiatives, healthcare decisions, philanthropic activity, pension policy, and business activities are all regulated through the tax code.[9] As one scholar put it, "presidents and the Congress have come to use tax breaks the way my mother used chicken soup—as a cure-all for any ill American society faces."[10]

Climate and energy policy is no exception. In the wake of congressional gridlock, failure on the Waxman-Markey Bill,[11] and the continuing dearth of broad, vocal support for comprehensive climate

6. *See, e.g.*, I.R.C. § 170(a)(1) (2012) (providing for an income-tax deduction for all charitable donations).

7. Many tax expenditures can alternatively be viewed as government regulation—as a conscious government decision to favor certain industries, products, and behaviors over others. *See, e.g.*, Seven-Sky v. Holder, 661 F.3d 1, 42 (D.C. Cir. 2011) (Kavanaugh, J., dissenting) (citing Sonzinsky v. United States, 300 U.S. 506, 513 (1937)) ("Regulatory taxes regulate behavior by imposing higher taxes on disfavored behavior and lower taxes on favored behavior."), *cert. denied* 133 S.Ct. 63 (2012), *abrogated by* Nat'l Fed'n of Indep. Bus. v. Sebelius, 567 U.S. 519 (2012).

8. *See, e.g.*, I.R.C. § 30(a) (providing a tax incentive for electric vehicles); I.R.C. § 2522(a) (providing a tax deduction for charitable donations); I.R.C. § 36(a) (providing a tax credit for first time homebuyers).

9. These subject areas are regulated through programs like the Home Mortgage Interest Deduction; the Earned Income Tax Credit; medical expense deductions and Flex spending accounts; the charitable deduction; Social Security and lower tax rates for capital gains. *See generally Credits & Deductions*, INTERNAL REVENUE SERV., https://www.irs.gov/credits-deductions [https://perma.cc/BNU2-D8WK] (last updated Mar. 13, 2017) (describing tax credits and deductions available to individuals and businesses).

10. MICHAEL J. GRAETZ, THE END OF ENERGY: THE UNMAKING OF AMERICA'S ENVIRONMENT, SECURITY, AND INDEPENDENCE 188 (2011).

11. *Id.* at 187. The Waxman-Markey Bill, formally known as the American Clean Energy and Security Act of 2009–2010, attempted to institute a nationwide cap-and-trade program, thereby putting a price on carbon. John M. Broder, *'Cap and Trade' Loses Its Standing as Energy Policy of Choice*, N.Y. TIMES (Mar. 25, 2010), http://www.nytimes.com/2010/03/26/science/earth/26climate.html [https://perma.cc/7K2K-A4CX]. However, this Bill failed to even reach a vote in the Senate. *Id.* Ultimately, both conservative and liberal groups opposed it. *Id.*

legislation, Congress turned to the tax code to implement climate policy. Instead of putting a price on carbon through a carbon tax or a cap-and-trade program to correct for externalities—the widely preferred policy option among economists—Congress and many state governments focused on subsidizing low-carbon alternatives.[12] As a result, over the past decade, tax expenditures subsidizing the deployment of clean energy, energy efficiency, and alternative vehicles have skyrocketed.[13] In 2013 alone, the federal government spent more than $1.8 billion on renewable-energy systems, energy-efficiency measures, and alternative-fuel vehicle purchases via tax expenditures.[14] Many state governments have followed suit, offering their own renewable-energy, energy-efficiency, and alternative-vehicle tax incentives.[15]

However, not all tax incentives are created equal: the structure of climate-change tax incentives matters. Many incentives have regressive distributional consequences based on their structure: they preferentially accrue to the affluent and not the poor.[16] Deductions and exclusions grant larger benefits to wealthier individuals in higher marginal tax brackets.[17] Non-refundable tax credits only allow individuals with positive tax liability

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12. David Driesen, *Putting a Price on Carbon: The Metaphor*, 44 ENVTL. L. 695, 697 (2014); Elia Pales, *Government Subsidies in Green Energy Are Investment in Our Future*, HILL (Sept. 3, 2015), http://thehill.com/blogs/congress-blog/energy-environment/252580-government-subsidies-in-green-energy-are-investment-in [https://perma.cc/4VET-X4PZ]. Even before Congress was as gridlocked as it is today, Congress turned to the tax code. GRAETZ, *supra* note 10, at 187. As Michael Graetz argues, "Since the 1970s, U.S. policy has been to subsidize the production and consumption of fuels we would like to encourage rather than to tax the use of fuels that we want to discourage." *Id.*

13. GRAETZ, *supra* note 10, at 187. According to the Energy Information Administration, after taking inflation into account, federal energy subsidies more than doubled between 1999 and 2007 from $8.2 billion to $16.6 billion with the share of renewable-energy subsidies increasing from 17% to 29% of the total during this time period. *Id.* Energy subsidies provided in the form of tax breaks more than tripled during this same eight-year time period. *Id.* An additional $37 billion in energy tax breaks was added in 2008 and 2010. *Id.* The American Recovery and Reinvestment Act of 2009 (the "stimulus bill") further increased these subsidies, bringing the total to approximately $100 billion available in renewable-energy and energy-efficiency tax subsidies and other incentives by 2010. *Id.*

14. DEP'T OF THE TREASURY, *supra* note 3.

15. *See Incentives*, TESLA, https://www.tesla.com/support/incentives [https://perma.cc/N4JE-LNQN] (last visited Mar. 3, 2017) (listing each state's rebates and tax credits, as well as other benefits, for buying an electric vehicle).

16. *See* David M. Schizer, Energy Subsidies: Worthy Goals, Competing Priorities, and Flawed Institutional Design 8 (Feb. 25, 2015) (unpublished manuscript), http://ssrn.com/abstract=2747610 [https://perma.cc/F78A-ACF9] (stating that the other environmental costs of energy, aside from climate change and pollution, are not convincing reasons to subsidize alternative energy).

17. Due to the nature of tax brackets, deductions and exclusions extend more benefits to high-income earners than low-income earners. *See, e.g.*, Stanley S. Surrey & Paul R. McDaniel, *The Tax Expenditure Concept and the Budget Reform Act of 1974*, 17 B.C. INDUS. & COM. L. REV. 679, 693 (1976) (labeling deductions and exclusions "upside-down" subsidies).

to take advantage of them, excluding many low-income earners.[18] Other tax incentives favor owners over renters.[19] Because of these structural elements, many tax incentives favor the wealthy.

Yet, despite the tax code's importance within climate and energy policy in the United States, very little has been written about the distributional impacts of United States climate-change tax policy. Only two papers have examined this issue in any depth, but they focused solely on a few federal tax programs from an economics, rather than a legal, lens.[20]

This article tackles the distributional question head on, examining three categories of climate-related tax subsidies—renewable-energy, energy-efficiency, and alternative-vehicle and -fuel tax subsidies—for potential structure-related distributional effects.[21] Part I describes the existing literature on the distributional impacts of United States climate-change tax subsidies. Part II explains why the structure of tax subsidies matters from a social-justice perspective. Part III argues why this structure matters in the climate-change context in particular. Part IV analyzes the structure of every federal- and state-level tax subsidy in the United States, focusing on who benefits from these subsidies. Finally, Part V discusses how we can reform existing subsidies to better reach low- and middle-income families, drawing on best practices from existing state programs.

## I. LITERATURE REVIEW

Despite the prominence of tax subsidies in the climate-policy arena and the known distributional impacts of tax incentives in other contexts, few have analyzed the distributional effects of climate-change tax subsidies in particular. Scholars have paid attention to clean-energy tax subsidies individually (especially their comparative advantages and disadvantages over other policy options)[22] as well as the distributional consequences of

18. *See* Andre R. Neveu & Molly F. Sherlock, *An Evaluation of Tax Credits for Residential Energy Efficiency*, 42 E. ECON. J. 63, 64 (2016) (examining specific tax incentives under federal policy).

19. *See generally* Severin Borenstein & Lucas Davis, *The Distributional Effects of U.S. Clean Energy Tax Credits* (Energy Inst. at Haas, Working Paper No. 262, 2015), https://ei.haas.berkeley.edu/research/papers/WP262.pdf [https://perma.cc/6KYG-F8XW] (examining four major U.S. federal income tax credits).

20. *See* Neveu & Sherlock, *supra* note 18, at 63 (discussing tax credits for residential energy efficiency); Borenstein & Davis, *supra* note 19, at 1–2 (discussing distributional effects on households of clean-energy credits).

21. Because corporate tax incentives have a less direct distributional impact, this article examines only individual tax subsidies.

22. *See, e.g.*, GRAETZ, *supra* note 10, at 188 (stating that there is significant variation in the amounts of energy subsidies relative to the fossil-fuel savings achieved); Hunt Allcott & Michael Greenstone, *Is There an Energy Efficiency Gap?*, J. ECON. PERSP., Winter 2012, at 3, 12; Severin

other policy levers, namely a price on carbon or increased gas taxes.[23] However, the distributional impacts of federal and state climate-change tax subsidies have largely been ignored in the literature.

Only two articles have described the distributional effects of climate-tax policy in any detail. Borenstein and Davis[24] analyzed federal tax-return data to examine the socioeconomic characteristics of recipients of four major federal tax credits: (1) the Nonbusiness Energy Property Credit,[25] (2) the Residential Energy Efficient Property Credit,[26] (3) the Alternative Motor Vehicle Credit,[27] and (4) the Qualified Plug-In Electric Drive Motor Vehicle Credit.[28] Borenstein and Davis found that government tax expenditures for these programs primarily accrued to higher-income households.[29] Of the $18 billion in federal income tax expenditures on these credits from 2006 to 2012, households in the bottom 60% of incomes only received about 10% of all credits, while households in the top 20% received 60% of all credits.[30]

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Borenstein, *The Private and Public Economies of Renewable Electricity Generation*, J. ECON. PERSP., Winter 2012, at 67; *see generally* Schizer, *supra* note 16 (comparing the success of clean-energy tax subsidies with other policy alternatives).

23. *See, e.g.*, Antonio M. Bento et al., *Distributional and Efficiency Impacts of Increased US Gasoline Taxes*, AM. ECON. REV., June 2009, at 667, 668 (focusing on gas-price distribution across differing incomes); *see generally* Dallas Burtraw et al., *The Incidence of U.S. Climate Policy: Alternative Uses of Revenues from a Cap-and-Trade Auction*, NAT'L TAX J., Sept. 2009, at 497 (evaluating cost to households of a carbon dioxide cap-and-trade program); Kevin Hassett et al., *The Incidence of a U.S. Carbon Tax: A Lifetime and Regional Analysis*, 30 ENERGY J., no. 2, 2009, at 155 (analyzing the impacts of a carbon tax on annual and lifetime household incomes); James M. Poterba, *Is the Gasoline Tax Regressive?*, 5 TAX POL'Y ECON. 145, 146 (1991) (analyzing gasoline tax incentives); James M. Poterba, *Lifetime Incidence and the Distributional Burden of Excise Taxes*, AM. ECON. REV., May 1989, at 325 (examining the incidence of excise taxes on gasoline); Sebastian Rausch et al., *Distributional Impacts of Carbon Pricing: A General Equilibrium Approach with Micro-Data for Households*, 33 ENERGY ECON. S20 (2011) (discussing impact of carbon pricing on household costs); Sarah E. West, *Distributional Effects of Alternative Vehicle Pollution Control Policies*, 88 J. PUB. ECON. 735 (2004) (examining distributional effects of policies that incentivize lower-emission vehicles); Robertson C. Williams et al., *The Initial Incidence of a Carbon Tax Across Income Groups*, NAT'L TAX J., Mar. 2015, at 195–96 (examining how carbon taxes are distributed amongst income classes).

24. Borenstein & Davis, *supra* note 19, at 3–8.

25. *Id.* at 3 (stating that the Nonbusiness Energy Property Credit is a credit for homeowners who weatherize or make energy-efficiency improvements to their homes).

26. *Id.* at 5 (stating that the Residential Energy Efficient Property Credit is a credit "for homeowners who install residential solar panels, solar water heating systems, and fuel cells").

27. *Id.* at 7 (stating that the Alternative Motor Vehicle Credit goes toward the purchase of certain qualified hybrids and other alternative-fuel vehicles).

28. *Id.* at 8 (stating that the Qualified Plug-In Electric Drive Motor Vehicle Credit is a credit toward the purchase of electric and plug-in hybrid vehicles).

29. *Id.* at 1 ("Overall, the bottom three income quintiles have received about 10% of all credits, while the top quintile has received about 60% [of all credits].").

30. *Id.*

Neveu and Sherlock employed a similar method.[31] They examined federal tax returns for the 2006 and 2007 tax years for two credits: the Nonbusiness Energy Property Credit and the Residential Energy Efficient Property Credit.[32] Similar to Borenstein and Davis, Neveu and Sherlock found that higher-income taxpayers claimed the majority of these credits.[33] More specifically, they found that although only "40 percent of tax returns [we]re filed by those with incomes above $50,000, 84 percent of the value of total credits claimed" in 2006 and 2007 went to these individuals.[34] In addition, they found that the average amount of tax credits claimed increased with income.[35]

Both sets of findings confirm that select federal, household-level climate tax credits raise distributive-justice concerns. However, both studies are limited in two respects. First, other than mentioning non-refundability,[36] neither paper examines why the structure of these subsidies results in distributional consequences. Second, both studies are narrow in scope, examining a total of four federal tax credits. The studies do not examine the full range of federal, household-level climate tax subsidies, and they entirely neglect the states. This article aims to fill both gaps.

## II. STRUCTURE MATTERS.

The structure of a tax subsidy determines which families can realistically take advantage of that subsidy. By structuring subsidies in certain ways, governments can target and advantage certain families over others. In particular, three key structural aspects of tax subsidies can result

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31. Neveu & Sherlock, *supra* note 18.

32. *Id.* at 64.

33. *Id.* at 66. A few additional articles have mentioned this issue in passing but have not devoted extensive space to it. *See, e.g.*, MARGOT L. CRANDALL-HOLLICK & MOLLY F. SHERLOCK, CONG. RESEARCH SERV., R42089, RESIDENTIAL ENERGY TAX CREDITS: OVERVIEW AND ANALYSIS (2014) ("Residential energy-efficiency tax incentives tend to be limited to higher-income taxpayers."); *see also* Schizer, *supra* note 16, at 44–46 (stating that commentators express concern about the distributional impacts of energy subsidies); *see also* Hunt Allcott et al., *Tagging and Targeting of Energy Efficiency Subsidies*, AM ECON. REV., May 2015, at 187 (studying the targeting of corrective subsidies and finding that "three major energy efficiency subsidies are preferentially adopted by . . . wealthy environmentalist homeowners").

34. Neveu & Sherlock, *supra* note 18, at 66.

35. *Id.* (finding that the "average credit amount claimed by those with incomes between $20,000 and $40,000 was roughly $190," while the average credit amount claimed by "those with incomes between $100,000 and $200,000 . . . was nearly $250").

36. *See Refundable vs. Non-Refundable Tax Credits*, U.S. TAX CTR., https://www.irs.com/articles/refundable-vs-non-refundable-tax-credits [https://perma.cc/V7WV-MZ26] (last visited Mar. 3, 2017) (defining non-refundable credits as credit subtracted from the taxes an individual owes up to the amount the individual owes with any excess amount expiring at the end of the year).

in distributional consequences: (1) whether tax incentives are structured as deductions and exclusions or as credits; (2) whether credits are refundable or can be carried forward; and (3) eligibility rules for the tax incentive.

First, whether tax incentives take the form of deductions and exclusions or credits can cause subsidies to differ across income classes. Deductions and exclusions are more regressive because they grant larger benefits to wealthier individuals in higher marginal tax brackets.[37] For example, a $500 tax deduction for energy-efficiency expenditures could be worth $75 to a family that makes $25,000 per year[38] and $165 to a family that makes $250,000 per year.[39] The same $500 tax deduction results in a larger grant to high-income families. In contrast, credits are more progressive because households in different tax brackets receive the same amount of money.[40] For example, a $500 tax credit is worth the same amount—$500—to households that make $25,000 or $250,000 per year (assuming both families have at least $500 in tax liability). Therefore, structuring renewable-energy, energy-efficiency, and alternative-vehicle tax subsidies as deductions and exemptions, rather than credits, will grant greater benefits to higher-income groups.

Although more progressive than deductions and exclusions, tax credits can also be regressive at times. Non-refundable tax credits only allow individuals with positive tax liability to take advantage of them, excluding many low- and middle-income earners entirely or partially.[41] For example, assume a government offers a $10,000 non-refundable tax credit for households that purchase electric vehicles. Assume further that a household makes $25,000 per year and has a tax liability of $1,000. If the household purchases an electric vehicle for $20,000, the household can only claim the

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37. Borenstein & Davis, *supra* note 19, at 13–15 (showing that 90% of homeowners in the fifth quintile own their home).

38. I assume a marginal tax rate of 15%.

39. I assume a marginal tax rate of 33%. This example ignores issues related to the standard deduction. *See, e.g.*, Dorothy A. Brown, *Shades of the American Dream*, 87 WASH. U. L. REV. 329, 334 (2009) (discussing ways in which the standard deduction plays a role in the housing tax policy setting).

40. Eduardo Porter, *Giving Every Child a Monthly Check for an Even Start*, N.Y. TIMES (Oct. 18, 2016), https://www.nytimes.com/2016/10/19/business/economy/giving-every-child-a-monthly-check-for-an-even-start.html [https://perma.cc/K98T-8LHS].

41. *Policy Basics: Tax Exemptions, Deductions, and Credits*, CTR. ON BUDGET & POL'Y PRIORITIES, http://www.cbpp.org/research/policy-basics-tax-exemptions-deductions-and-credits [https://perma.cc/SD7N-X8GE] (last updated July 7, 2015). Over a third of low-income households have no tax liability whatsoever. Borenstein & Davis, *supra* note 19, at 24; Lily L. Batchelder et al., *Efficiency and Tax Incentives: The Case for Refundable Tax Credits*, 59 STAN. L. REV. 23, 28–29 (2006).

credit up to the full amount of their tax liability, in this case $1,000.[42] In contrast, a household making $400,000 per year with a higher tax liability would be able to claim the full $10,000 credit. Therefore, the same $10,000 tax credit is worth $1,000 to the low-income household and $10,000 to the high-income household. In other words, the low-income household would end up spending $19,000 on the exact same car that the high-income household bought for $10,000. In practice, non-refundable tax credits mean that higher-income families can take greater advantage of tax credits than low- and middle-income families.

Refundability provisions mitigate this issue. Refundable credits allow families to take full advantage of the credits regardless of income.[43] For example in the above scenario, if the credit is refundable, both families would receive the full $10,000 credit, either in the form of reduced tax liability or a refund for excess credits above their liability. Thus, both families would pay the same amount ($10,000) for the same car. In addition, a refundable credit would provide the same cash payment to households who owe no income tax.

Carry-forward provisions also help ensure that low- and middle-income families can take advantage of a larger amount in credits.[44] Carry-forward provisions allow families to carry forward any unused tax credits to subsequent tax years. For example in the above scenario, the low-income household could carry forward the excess $9,000 in tax credits for use in later tax years. Assuming that the household continues to have $1,000 in tax liability each year, the family could apply $1,000 in tax credits in year two, $1,000 in year three, and so on. The family could thus receive the full $10,000 credit over ten years instead of one. However, refundable credits are still preferable to carry-forward provisions for a number of reasons. For one, many tax credits with carry-forward provisions include a limit on the number of years that the credit can be carried forward. For example, a carry-forward credit with a three-year cap would only allow the low-income family to receive $3,000 in credits ($1,000 per year for three years)—more than the $1,000 in the scenario above but less than the full $10,000 credit amount. In addition, carry-forward structures grant greater benefits to high-income earners due to upfront costs and the time advantage of money.

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42. *See* Neveu & Sherlock, *supra* note 18, at 63 (stating that taxpayers must have positive tax liability in order to benefit from non-refundable tax credits); *see also* Borenstein & Davis, *supra* note 19, at 22 (explaining that a "taxpayer with $500 of tax liability cannot claim $1000 in credits").

43. INST. ON TAXATION & ECON. POLICY, WHO PAYS?: A DISTRIBUTIONAL ANALYSIS OF THE TAX SYSTEMS IN ALL 50 STATES 10 (5th ed. 2015), http://www.itep.org/pdf/whopaysreport.pdf [https://perma.cc/CY64-HZDR].

44. *See* Neveu & Sherlock, *supra* note 18, at 64 (suggesting that carry-forward provisions address inequity).

Finally, eligibility restrictions may exclude many low- and middle-income households. Categories of eligibility define which households may receive a tax subsidy.[45] Many tax incentives favor owners over renters, excluding, by default, low-income households that lack the upfront capital necessary to purchase various goods or services.[46] For example, tax subsidies targeted at homeowners by nature exclude a large percentage of low-income and minority households because higher proportions of both these populations tend to rent rather than own homes.[47] Approximately 50% of low-income and minority households in the United States rent rather than own their home.[48] In contrast, close to 90% of households in the top 25% of incomes own their home.[49] Furthermore, the overall number of people who rent is growing, with renters becoming increasingly concentrated at lower-income levels.[50] These trends have important implications for climate tax subsidies. Renewable-energy and energy-efficiency tax subsidies targeted at homeowners alone may fail to reach a growing segment of the population, in particular, low-income and minority households.[51]

Leasing versus ownership also affects the adoption of alternative vehicles and renewable-energy systems. Although leasing versus ownership rates for cars do not break down as readily by class as they do in the homeownership context,[52] low-income households do tend to own older,

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45. OFFICE OF CMTY. PLANNING AND DEV., U.S. DEP'T OF HOUS. & URBAN DEV., COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM 2-1 (n.d.), https://www.hudexchange.info/resources/documents/CDBG_Guide_National_Objectives_Eligible_Activities.pdf [https://perma.cc/DU5N-CXPP].

46. BARBARA SARD & WILL FISCHER, RENTERS' TAX CREDIT WOULD PROMOTE EQUITY AND ADVANCE BALANCED HOUSING POLICY 3 (2013).

47. JOINT CTR. FOR HOUS. STUDIES OF HARVARD UNIV., AMERICA'S RENTAL HOUSING—MEETING CHALLENGES, BUILDING ON OPPORTUNITIES 15, 17 (2015), http://www.jchs.harvard.edu/sites/jchs.harvard.edu/files/ahr2011-3-demographics.pdf [https://perma.cc/DU5N-CXPP].

48. *Id.* (explaining that renters as a whole are likely to have lower incomes than homeowners across all age groups, with the median income of renters about half that of same-aged owners); *see also* Brown, *supra* note 39, at 340 (discussing home-ownership rates by income).

49. *Id.*

50. JOINT CTR. FOR HOUS. STUDIES OF HARVARD UNIV., *supra* note 47, at 17 ("From 1990 to 2010, households with incomes below the national median accounted for 84 percent of the growth in renters, while higher-income households drove virtually all of the growth in owners. Fully 60 percent of the increase in renters came from households in the bottom income quartile alone. By 2010, approximately 70 percent of renter households had incomes below the national median and more than 40 percent had incomes in the bottom quartile.").

51. Various city-level and social differences in homeownership rates also exist. *Id.* at 16 (explaining that single-parent households are more likely to rent rather than buy, as are households in high-cost housing markets, such as New York City, Los Angeles, San Diego, and Honolulu, where few affordable options exist).

52. Borenstein & Davis, *supra* note 19, at 12.

less fuel-efficient, higher-polluting, and higher-cost cars.[53] This situation makes it especially important from a climate perspective for these individuals to transition to low-carbon vehicles. However, hybrid and electric vehicles come with high upfront costs.[54] The same holds true for renewable-energy systems.[55] Many renewable-energy systems require upfront costs in the thousands of dollars.[56] Leasing fuel-efficient cars and renewable-energy systems can allow low- and middle-income families to transition to these alternatives in an affordable manner. Therefore, tax-subsidy programs that exclude these categories may have distributional implications.

Structure affects distribution. Deductions, exemptions, and non-refundable tax credits grant more money to high-income earners, while limited categories of eligibility exclude many low-income families.[57] In practice, these structural policy choices mean that many tax subsidies advantage the wealthy over the poor. Only a narrow category of subsidies—refundable tax credits with broad categories of eligibility—do not fit this profile.[58] Refundable tax credits with broad categories of eligibility are the only type of tax subsidy that grant families equal assistance regardless of income.[59] The following section discusses why we should strive for this form of tax subsidy in the climate context.

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53. *See, e.g.*, VICTORIA ALVAREZ, ASSEMB. COMM. ON TRANSP., BILL ANALYSIS: S.B. 459 4 (Cal. 2013) (commenting that older, high-polluting cars are often owned by lower-income households); Sarah Rohrs, *Report: Rural Area Older Cars Make Most Pollution*, TIMES-HERALD (Feb. 28, 2014, 12:01 AM), http://www.timesheraldonline.com/article/ZZ/20140228/NEWS/140227113 [https://perma.cc/G4ZS-SBNG].

54. Gil Tal & Michael A. Nicholas, *Studying the PEV Market in California: Comparing the PEV, PHEV and Hybrid Markets*, IEEE, Nov. 2013, at 1, 3.

55. *See* INT'L RENEWABLE ENERGY AGENCY, SUMMARY FOR POLICY MAKERS: RENEWABLE POWER GENERATION COSTS 3 (2012) (listing upfront costs as a barrier to investments in renewables).

56. *See, e.g.*, *Questions About Going Solar*, NRG HOME SOLAR, https://www.nrghomesolar.com/faqs/ [https://perma.cc/7A6U-D628] (last visited May 14, 2017) (explaining that systems may cost between $18,000 and $20,000).

57. For example, many credits are simply unavailable to people without the means to purchase the subsidized items. *See, e.g.*, *2016 Federal Tax Credits*, ENERGYSTAR, https://www.energystar.gov/about/2016_federal_tax_credits [https://perma.cc/JF3J-7T8T] (last visited Mar. 11, 2017) (listing 2016 tax credits available for the purchase of qualifying, energy-efficient home appliances).

58. *See* Scott A. Hodge, *Biggest Challenge to Tax Reformers: Overcoming Our Progressive Tax Code*, TAX FOUND. (Oct. 7, 2015), http://taxfoundation.org/blog/biggest-challenge-tax-reformers-overcoming-our-progressive-tax-code [https://perma.cc/4LCW-GQTD] (discussing how increased use of refundable tax credits has made our income-tax system more progressive and benefitted both low- and middle-class families).

59. *Id.*

## III. WHY WE SHOULD CARE ABOUT THE STRUCTURE OF RENEWABLE-ENERGY, ENERGY-EFFICIENCY, AND ALTERNATIVE-VEHICLE TAX INCENTIVES

We should care how governments structure climate-change tax subsidies for four main reasons. First, it may be more cost-effective for climate-change tax subsidies to target low- and middle-income households rather than high-income earners. Second, providing larger climate-change tax subsidies to high-income families may be economically inefficient. Third, equitable access to climate-change tax incentives may build greater political support for other climate programs. Finally, regressive climate tax subsidies may exacerbate existing income inequality.

Government tax subsidies for renewable energy, energy efficiency, and alternative vehicles can serve multiple goals. First, clean-energy and vehicle tax subsidies aim to correct market failures and encourage consumers to invest in renewable-energy, energy-efficiency, and alternative-vehicle technologies to achieve more widespread deployment.[60] In line with this goal, some have argued that renewable-energy, energy-efficiency, and alternative-vehicle tax subsidies should target high-income earners.[61] Because high-income earners can be motivated by smaller subsidy amounts, governments should actively target high-income earners to bring more people on board for less public dollars spent—or so the argument goes.[62] We should "pursue energy goals as cost-effectively as possible, without regard to distribution."[63]

However, this theory fails to account for a number of factors specific to the climate context. First, renewable-energy and energy-efficiency improvements often pay for themselves in the form of lower energy costs. On average, solar panels pay for themselves within 7 to 15 years.[64] Energy-efficiency improvements have an average 20% to 30% return on

60. Rosaly Byrd, *Getting Energy Subsidies to Work in Favor of the Environment*, HUFFINGTON POST, http://www.huffingtonpost.com/rosaly-byrd/fossil-fuel-tax-subsidies_b_5837608.html [https://perma.cc/T5T2-XC2R] (last updated Nov. 17, 2014).

61. *See, e.g.*, Schizer, *supra* note 16, at 44–46 (stating that, even when provided with subsidies, low- and middle-income households are still likely to choose cheaper, conventional vehicles and that alternative-vehicle subsidies offer environmental and national-security benefits for all, not simply private benefits to the vehicle driver).

62. In addition, the positive externalities associated with clean-energy technology adoption (e.g., reduced greenhouse-gas emissions) are the same regardless of who adopts the technology.

63. Schizer, *supra* note 16, at 46.

64. *Id.*; Mathias Aare Maehlum, *How Long to Pay Off My Solar Panels?*, ENERGY INFORMATIVE (July 18, 2014), http://energyinformative.org/long-pay-solar-panels/ [https://perma.cc/DX9E-3JUL].

investment.[65] Alternative vehicles, such as hybrid and electric cars, cost less in fuel and maintenance in the long term and, consequently, may have lower lifecycle costs than internal combustion engine vehicles.[66]

As a result, one of the largest market failures in the clean-energy and alternative-vehicle context may be consumer-credit constraints.[67] If individuals cannot afford the high upfront costs of these technologies, they will not invest.[68] Accordingly, the most cost-effective response to this market failure may be to target credit-constrained consumers: low- and middle-income families.[69] High-income earners can afford to invest the upfront costs and reap the long-term cost savings.[70] Given the cost-saving potential, high-income families may choose to invest in renewable energy, energy efficiency, and alternative vehicles regardless of the subsidy offered.[71] Therefore, to the extent that current climate-change subsidies target high-income earners only, they may not reach their maximum cost-effectiveness potential.

Second, providing a larger tax incentive to high-income households may be economically inefficient. As three scholars argue, "providing a larger incentive to higher-income households is economically inefficient unless policymakers have specific knowledge that such households are

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65. MICHAEL B. GERRARD, THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES 7 (2011).

66. Kristy Hartman, *State Efforts Promote Hybrid and Electric Vehicles*, NAT'L CONF. OF STATE LEGISLATURES (Dec. 3, 2015), http://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx [https://perma.cc/GZ9J-B8MG] ("As of November 2015, the U.S. Department of Energy estimates that it costs $1.18, on average, to drive an electric vehicle as far as a conventional car travels on $2.09 worth of gasoline."); Antony Ingram, *Electric Car Maintenance A Third Cheaper than Combustion Vehicles?*, GREEN CAR REP. (Dec. 6, 2012), http://www.greencarreports.com/news/1080925_electric-car-maintenance-a-third-cheaper-than-combustion-vehicles [https://perma.cc/9QYG-Q5MZ] (suggesting that electric-vehicle maintenance costs may be 35% less expensive than standard internal-combustion-engine vehicles); *Getting Charges Up over Electric Vehicles*, TOUCHSTONE ENERGY COOPERATIVES, http://touchstoneenergy.coopwebbuilder2.com/content/getting-charged-over-electric-vehicles [https://perma.cc/B5MC-WJQ6] (last visited Feb. 26, 2017).

67. CRANDALL-HOLLICK & SHERLOCK, *supra* note 33, at 6.

68. *See* INT'L RENEWABLE ENERGY AGENCY, *supra* note 55, at 3 (suggesting that investment in alternative energy developed slowly due to initial high costs).

69. Julian Spector, *Where America's Poor Pay the Most for Electricity*, CITYLAB (Apr. 14, 2016), http://www.citylab.com/housing/2016/04/electricity-bills-by-city-low-income-costs/478155/ [https://perma.cc/6BWF-WUSZ] (explaining how new efficiency upgrades require high upfront costs that put them out of reach for lower income families).

70. *See, e.g.*, *The Real Costs of Owning a Hybrid*, EDMUNDS (Sept. 9, 2013), https://www.edmunds.com/fuel-economy/the-real-costs-of-owning-a-hybrid.html [https://perma.cc/BX22-PZTE] (discussing the higher cost of hybrid vehicles generally and noting that "about a third of the hybrid models in the market in 2013 will earn back their price premiums in five years or less through fuel savings alone").

71. If high-income earners are not making these investments, consumer information asymmetries may be at play—namely consumers may not know that these are cost-saving investments. In this case, public dollars may be best spent educating the public.

more responsive to the incentive or that their engaging in the behavior generates larger social benefits."[72] Neither of these exceptions likely applies in the climate-change tax incentive context. As the scholars go on to argue, "a tax incentive provision correcting for positive externalities"—like climate-change tax incentives—"should apply uniformly across the income distribution" to minimize distortions and improve economic efficiency.[73] Tax forms that apply uniformly across income groups, such as refundable tax credits, may reduce deadweight loss, increase economic efficiency, and provide a "more even and widespread motivation for socially valued behavior," like transitioning to low-carbon energy and vehicle options.[74]

Third, subsidies can help build political support for other short- and long-term climate goals. The environmental movement has a history as a high-income and predominantly white movement.[75] Past waves of the environmental movement have largely ignored poor and minority communities, ultimately hindering the movement's ability to achieve short- and long-term goals.[76] Environmentalists need to change this dynamic. Putting aside the equity and moral considerations inherent in this dynamic, environmentalists need to build a broader coalition and political support for climate initiatives. In the short term, broader political support will help prevent the movement from being out-maneuvered politically.[77] In the long term, the movement needs broader political support to succeed. Any successful long-term climate strategy will require the United States to fundamentally restructure its economy, its cities, and its people's lifestyles. As one author observed, this change "is the work of tens of millions, not hundreds of thousands."[78] To the extent that tax subsidies target and support high-income earners only, they will miss the mark. We need government investments to target a diverse group of families—or at the very least ensure that all families have equal access to subsidies if they desire. This

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72. Batchelder et al., *supra* note 41, at 24.

73. *Id.* at 27–28. Batchelder, Goldberg, and Orszag also argue that uniform refundable tax credits "further enhance economic efficiency by smoothing household income shocks and macroeconomic fluctuations." *Id.* at 24.

74. *Id.*

75. Jones, *supra* note 1.

76. *Id.* ("California provides a cautionary tale; voters there rejected a 2006 ballot measure to fund clean energy research. A small excise tax on the state's oil extraction would have produced a huge fund, propelling California into the global lead in renewable energy. But the same message that wooed Silicon Valley and Hollywood elites flopped among regular voters. Clean energy proponents ran abstract ads about 'energy independence' and the bright eco-future. But big oil spoke directly to pocket-book issues, running ads that warned (falsely) that the tax would send gas prices through the roof. On that basis, an NAACP leader and others joined the opposition. And the measure's original sky-high support plummeted.").

77. *Id.*

78. *Id.*

investment, in turn, could bring new families into the movement and broaden support for other non-tax clean-energy and climate initiatives.

Finally, regressive clean-energy and vehicle tax subsidies exacerbate existing income inequalities and raise equity concerns. Clean-energy and vehicle tax incentives allow families to transition to these technologies in a cost-effective manner. This transition, in turn, generates environmental and national-security benefits for everyone as well as private benefits to individuals in the form of reduced energy costs.[79] These savings are substantial. The cost savings from going solar alone can reach thousands each year.[80] Low- and middle-income families could use these added dollars. Low-income families spend a higher percentage of their income meeting their energy needs.[81] If clean-energy and vehicle tax subsidies preferentially accrue to high-income earners, the subsidies will exacerbate existing income inequalities. In contrast, if governments make tax subsidies available to all families—or target low-income families specifically—governments will put more money back in the pockets of families who need it most.

In 2007, activist Van Jones argued that the clean-energy investment wave of the present had the opportunity to unite environmentalists and struggling communities to achieve a new green economy.[82] Tax subsidies are a significant part of that wave. If climate subsidies target high-income families only, they will miss this opportunity.

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79. *Id.*

80. *See, e.g.*, *Questions About Going Solar*, *supra* note 56 (stating that the average homeowner saves over $1,000 each year by installing solar panels); *see also* Zachary Shahan, *How Much Are Solar Panels? Wrong Question. Ask How Much Solar Panels Can Save You*, CLEAN TECHNICA (Feb. 3, 2014), http://cleantechnica.com/2014/02/03/much-can-solar-panels-save/ [https://perma.cc/GSX3-6JHA] (demonstrating that over a 20-year period, average savings are as high as $64,769, which breaks down to $3,238 in savings per year); *see also* JIM KENNERLY & AUTUMN PROUDLOVE, N.C. CLEAN ENERGY TECH. CTR., GOING SOLAR IN AMERICA: RANKING SOLAR'S VALUE TO CONSUMERS IN AMERICA'S LARGEST CITIES 10 (n.d.), https://nccleantech.ncsu.edu/wp-content/uploads/Going-Solar-in-America-Ranking-Solars-Value-to-Customers_FINAL.pdf [https://perma.cc/2QV8-SSNJ] (stating that solar customers save up to $187 per month in the first year).

81. *See, e.g.*, Diana Hernández & Stephen Bird, *Energy Burden and the Need for Integrated Low-Income Housing and Energy Policy*, POVERTY PUB. POL'Y, Nov. 2010, at 5, 7 (stating that low income and very poor households spend upwards of 10% and 20% of their total household income, respectively, on energy, compared to 5% or less for middle- and upper-income households).

82. Jones, *supra* note 1.

## IV. ANALYZING CURRENT FEDERAL AND STATE, HOUSEHOLD-LEVEL RENEWABLE-ENERGY, ENERGY-EFFICIENCY, AND ALTERNATIVE-VEHICLE AND -FUEL TAX SUBSIDIES

This section analyzes current federal and state renewable-energy, energy-efficiency, and alternative-vehicle and -fuel tax subsidies. I used two Department of Energy databases to catalog all federal and state household-level tax incentives: the Database of State Incentives for Renewables & Efficiency (DSIRE)[83] and the Alternative Fuels Data Center.[84] DSIRE collects information on all state and federal renewable-energy and energy-efficiency initiatives.[85] I used this database to catalog every federal and state, household-level renewable-energy and energy-efficiency tax credit, deduction, exemption, and property tax incentive currently available in the United States: 94 tax incentives total.[86] The Alternative Fuels Data Center provides comparable information for federal and state alternative-vehicle and -fuel initiatives.[87] I used the Alternative Fuels Data Center to catalog every federal and state, household-level alternative-vehicle or -fuel tax credit, deduction, and exemption currently available in the United States: 29 incentives total.[88]

This section analyzes all the state and federal programs identified for certain key distributional criteria. This section is divided into two subsections: (1) energy-efficiency and renewable-energy tax incentives and (2) alternative-vehicle and -fuel tax incentives. Each subsection analyzes the respective programs for the following distributional characteristics: (1) the types of tax incentives available, in particular, whether the incentives

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83. *See Database of State Incentives for Renewables & Energy Efficiency*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://www.dsireusa.org/ [https://perma.cc/UU3N-X97V] (last visited Mar. 2, 2017) [hereinafter *DSIRE*] (providing an avenue to search state tax incentives and policies).

84. *See generally Alternative Fuels Data Center*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/ [https://perma.cc/X67L-LQSQ] (last visited Mar. 3, 2017).

85. *See generally DSIRE*, *supra* note 83 (providing a searchable database of state renewable energy incentives).

86. Tables 1–2 detail renewable-energy and energy-efficiency tax deductions and exemptions. Tables 3–5 detail renewable-energy and energy-efficiency tax credits. Section IV(A)(3) details renewable-energy and energy-efficiency property tax incentives. For each of these tables, I filtered by the relevant category (e.g., "personal tax deduction and exemption," "personal tax credit," or "property tax incentive") and limited the applicable sector to "residential" to capture household-level incentives.

87. *About the Alternative Fuels Data Center*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/about.html [https://perma.cc/F28W-J2WR] (last updated Oct. 21, 2016).

88. I limited the dataset to "Laws and Incentives," limited the incentive type to "Tax Incentives," limited the user type to "Vehicle owner/driver," and set the expiration category to "No." *See Data Downloads*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/data_download [https://perma.cc/3L8A-4W8T] (last updated Jan. 3, 2017) (providing data on federal and state fuel taxes).

take the form of credits or deductions/exemptions; (2) provisions for excess credits (i.e., refundability and carry-forward provisions); and (3) categories of eligibility, specifically whether renters and lessees of homes, renewable-energy systems, and cars qualify as well as owners. As discussed in Part II, each of these characteristics—the type of program, provisions for excess credits, and categories of eligibility—can result in progressive or regressive distribution of climate tax incentive dollars.[89]

Where possible, I rate each tax credit based on these structural elements to come up with an aggregate measure of progressivity. This measure is of course not a definitive quantitative ranking. Nevertheless, it presents a useful way to compare various incentives. In addition, where possible, I discuss the amount of money flowing through each subsidy program. Unfortunately, many states do not release this information, so monetary data for the state level is limited.[90] Despite these limitations, the overall data indicates that state programs are more progressive than their federal counterparts.[91]

### *A. Energy-Efficiency and Renewable-Energy Tax Incentives*

Eighteen states, the federal government, and Puerto Rico currently offer a renewable-energy or energy-efficiency tax deduction or credit.[92] States offer 29 of these incentives, the federal government offers 3, and Puerto Rico offers 1.[93] Approximately 30% of the incentives take the form of deductions or exemptions (ten deductions/exemptions total) and 70% take the form of tax credits (23 credits total).[94]

#### 1. Tax Deductions and Exemptions

Governments currently offer ten renewable-energy or energy-efficiency deductions and exemptions. The federal government offers one exemption. Six different states and one territory offer the remaining nine deductions. Five deductions cover renewable energy, and five cover energy-efficiency improvements.

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89. *See supra* Part II.

90. *See generally DSIRE*, *supra* note 83 (listing state tax incentive information).

91. *See generally infra* Tables 1–6 (detailing and ranking state and federal tax incentive programs according to progressivity).

92. *See infra* Tables 1–5.

93. *Id.*

94. *Id.*; *see also DSIRE*, *supra* note 83 (listing 10 different personal tax deduction programs and 39 different personal tax credit programs).

Table 1. Federal and State Renewable-Energy Tax Deductions[95]

| Entity | Program Title | Home Renters Eligible | Monetary Considerations |
|---|---|---|---|
| Alabama | Wood-Burning Heating System Deduction | Yes | Maximum Incentive: None |
| Arizona | Qualifying Wood Stove Deduction | Yes | Maximum Incentive: $500 |
| Idaho | Residential Alternative Energy Tax Deduction | Unclear[96] | Maximum Incentive: $5,000 per year; $20,000 total |
| Indiana | Income Tax Deduction for Solar-Powered Roof Vents or Fans | Yes | Maximum Incentive: $1,000 |
| Puerto Rico | Tax Deduction for Solar Energy Systems | Yes | Maximum Incentive: $1,500 |

95. The information included in Tables 1–2 is based on the Department of Energy's Database of State Incentives for Renewables & Efficiency, filtered to only include the Program Types "Personal Tax Deduction" and "Personal Tax Exemption" and the "Residential" sector.

96. Email from Scott Pugrud, Attorney/Program Manager, Idaho Governor's Office of Energy Res., to author (Apr. 22, 2016).

Table 2. Federal and State Energy-Efficiency Tax Deductions

| Entity | Program Title | Home Renters Eligible | Monetary Considerations |
|---|---|---|---|
| United States | Residential Energy Conservation Subsidy Exclusion[97] | Yes | Maximum Incentive: None |
| Idaho | Income Tax Deduction for Energy-Efficiency Upgrades | Unclear (primary residence only)[98] | Maximum Incentive: None |
| Indiana | Income Tax Deduction for the Installation of Building Insulation | Yes | Maximum Incentive: $1,000 |
| Missouri | Tax Deduction for Home Energy Audits and Energy-Efficiency Improvements | No | Maximum Incentive: $1,000 per year for individual taxpayers; $2,000 per year for married taxpayers filing jointly |
| Virginia | Income Tax Deduction for Energy-Efficient Products[99] | Yes | Maximum Incentive: $500 |

From a distributional perspective, the deductions that states and the federal government offer are inclusive in terms of eligibility categories. Six state deductions and the federal exemption clearly include home renters.[100] In addition, from a big-picture perspective, rather than offer deductions, many states and the federal government choose to focus the bulk of their climate-tax-subsidy dollars in the form of credits.[101] For example, the federal tax exemption simply excludes all energy conservation subsidies

97. The federal program focuses on energy conservation but may include renewable components. As DSIRE notes: "The term 'energy conservation measure' includes installations or modifications primarily designed to reduce consumption of electricity or natural gas, or to improve the management of energy demand. . . . The definition of 'energy conservation measure' implies that utility rebates for residential solar-thermal projects and photovoltaic (PV) systems may be non-taxable. However, the IRS has not ruled definitively on this issue." *Residential Energy Conservation Subsidy Exclusion (Personal)*, DSIRE N.C. CLEAN ENERGY TECH. CTR. (May 26, 2016), http://programs.dsireusa.org/system/program/detail/666 [https://perma.cc/6EMY-8TKU].

98. Email from Scott Pugrud, *supra* note 96.

99. This deduction also applies to fuel cells. *Income Tax Deduction for Energy-Efficient Products*, DSIRE N.C. CLEAN ENERGY TECH. CTR. (Nov. 7, 2014), http://programs.dsireusa.org/system/program/detail/4362 [https://perma.cc/FLL4-7SMP].

100. *See supra* Tables 1–2.

101. *Compare supra* Tables 1–2 (listing federal and state renewable-energy and energy-efficiency deductions), *with infra* Tables 3–5 (listing federal and state renewable-energy and energy-efficiency credits).

provided to customers by public utilities.[102] Rather, the bulk of federal tax incentives take the form of tax credits as discussed in the following subsection.[103] Of the six state deductions, two states also offer tax credits.[104] Overall, only four states offer renewable-energy and/or energy-efficiency tax deductions alone.[105]

### 2. Tax Credits

Fourteen states and the federal government offer 23 household-level renewable-energy and energy-efficiency tax credits[106] collectively, with states responsible for 21 of these credits and the federal government responsible for 2. The states that offer these credits vary both in geographic location and political ideology, including Arizona, Hawaii, Iowa, Louisiana, Massachusetts, Maryland, Montana, Nebraska, New Mexico, New York, Oregon, South Carolina, Utah, and Virginia.[107] Of the 23 credits, the majority focus on renewable energy with 17 renewable-energy credits, 4 energy-efficiency credits, and 2 credits that cover both renewable-energy and energy-efficiency measures.[108]

The credits offered differ greatly in both amount and structure.[109] I rate the credits according to the following progressivity point system: three points for refundable credits, two points for credits that can be carried forward for five years or more, one point for credits that can be carried forward for less than five years, one point for credits that allow tenants to qualify, and one point for credits that apply to leased renewable-energy systems, yielding a maximum five points possible for renewable-energy and four points possible for energy-efficiency.[110] This measure is of course not a definitive quantitative ranking. Nevertheless, it presents a useful way to

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102. *Residential Energy Conservation Subsidy Exclusion (Personal)*, supra note 97.

103. *See infra* Tables 3–5.

104. *Compare supra* Tables 1–2 (listing federal and state renewable-energy and energy-efficiency deductions), *with infra* Tables 3–5 (listing federal and state renewable-energy and energy-efficiency credits).

105. *See supra* Tables 1–2; *see infra* Tables 3–5.

106. *See infra* Tables 3–5 (showing that many of these credits are available to businesses as well as households).

107. *Id.*; *DSIRE*, *supra* note 83.

108. *See id.* (listing whether the program is focused on renewable energy credits, energy efficiency credits, or both renewable-energy and energy-efficiency credits).

109. *See infra* Tables 3–5 (detailing the amount and structure of credits offered).

110. I should note that the federal government and some states have matching corporate tax credits that allow the lessor of solar systems to qualify for the credit. For example, companies such as Solar City receive a tax credit from the federal government when they install leased systems. This setup allows these companies to lower the rental costs for the lessee. Therefore, the individual rating system for leased systems may not capture the full picture.

compare various incentives. I code subsidies with a score of 0–1 as more regressive (red); scores of 2–3 as mixed (yellow); and scores of 4–5 as progressive (green). The following three charts summarize the programs. Where possible, I include monetary data in the last column.

Table 3. Federal and State Renewable-Energy Tax Credits[111]

| Entity | Program Title | Rating | Carryover | Refundable | Home Renters/ Rented Systems | Monetary Considerations |
|---|---|---|---|---|---|---|
| United States | Residential Renewable Energy Tax Credit | 1 | Yes (up to one year) | No | No (Homes)<br>No (Systems) | Maximum Incentive: No maximum credit for solar-electric systems, solar water heaters, wind turbines, or geothermal heat pumps. For fuel cells, there is a maximum credit of $500 per 0.5 kW.<br>Budget: No maximum budget. In 2010, 2011, and 2012, the federal government spent $754 million, $921 million, and $818 million respectively on this program.[112] |
| Arizona | Residential Solar & Wind Energy Systems Credit | 3 | Yes (up to five years) | No | Yes (Homes)<br>No (Systems) | Maximum Incentive: $1,000 maximum credit per residence.<br>Budget: No maximum budget. |

111. The information included in Tables 3–5 is based on the Department of Energy's Database of State Incentives for Renewables & Efficiency, filtered to only include the Program Type "Personal Tax Credit" and the "Residential" sector.

112. Borenstein & Davis, *supra* note 19, at 10.

| | | | | | | |
|---|---|---|---|---|---|---|
| Hawaii | Renewable Energy Technologies Income Tax Credit | 3 | Yes (until exhausted) | Yes, under certain conditions[113] | No (Homes) No (Systems)[114] | Maximum Incentive: Varies by technology and property type.[115] Budget: No maximum budget. |
| Iowa | Geothermal Heat Pump Tax Credit | 2 | Yes (up to ten years) | No | No (Homes) N/A (Systems) | Maximum Incentive: None Budget: No maximum budget. |
| Iowa | Solar Energy Systems Tax Credit | 2 | Yes (up to ten years) | No | No (Homes) No (Systems)[116] | Maximum Incentive: $5,000 maximum credit per residence. Budget: $5 million cumulative limit per year (both personal and corporate) with a minimum of $1 million reserved for residential solar installations. Credits granted on a first-come, first-served basis. |
| Louisiana | Tax Credit for Solar Energy Systems on Residential Property | 4 | No | Yes | No (Homes) Yes (Systems) | Maximum Incentive: $10,000 per customer-owned system and $7,600 per leased system. One installed system per residence. Budget: $10 million limit for FY2016 and FY2017; $5 million limit for FY2018. Credit granted on a first-come, first-served basis. |
| Mass. | Residential Renewable Energy Income Tax Credit | 3 | Yes (up to three years) | No | Yes (Homes) Yes (Systems)[117] | Maximum Incentive: $1,000 Budget: No maximum budget. |

113. HAW. REV. STAT § 235-12.5 (2016). A new provision was added to the tax credits in June of 2009 under SB 464. *Id.* This legislation, effective July 1, 2009, allows the tax credit to be refundable under certain conditions. *Id.* For solar energy systems, all taxpayer can elect to reduce the eligible credit amount by 30%, and if this reduced amount exceeds the amount of income taxes to be paid by the taxpayer, the excess credit will be refunded to the taxpayer. *Id.* For taxpayers whose entire income is exempt or whose adjusted gross income is $20,000 or less (or $40,000 or less if filing jointly), these taxpayers may elect to receive any excess credit for any renewable energy technology systems as a refund. *Id.*

114. The company that leases the system would receive the credits. Telephone Interview with Haw. Dep't of Taxation (Apr. 22, 2016).

115. For example, for photovoltaic and solar space heating systems, there is a limit of $5,000 for older single-family residential properties, $2,250 for new single-family residential properties, and $350 per unit for multi-family residential properties.

116. Technically, leased systems qualify, but only one individual can claim the credit. Because the solar-leasing company would own the system, the company would claim the credit over the lessee; this is similar to the federal credit. Telephone Interview with Jennifer, Iowa Dep't of Revenue (Apr. 22, 2016).

117. Telephone Interview with Representative, Mass. Dep't of Revenue (Apr. 22, 2016).

| | | | | | | |
|---|---|---|---|---|---|---|
| Maryland | Bio-Heating Oil Tax Credit | 0 | No | No | N/A (Homes)<br>N/A (Systems) | Maximum Incentive: $500 per year.<br>Budget: No maximum budget. |
| Montana | Residential Alternative Energy System Tax Credit | 2 | Yes (up to four years) | No | Yes (Homes)<br>No (Systems)[118] | Maximum Incentive: $500 per individual, up to $1,000 for a married couple filing jointly.<br>Budget: No maximum budget. |
| Montana | Residential Geothermal Systems Credit | 3 | Yes (up to seven years) | No | Yes (Homes)<br>N/A (Systems) | Maximum Incentive: $1,500 per household.<br>Budget: No maximum budget. |
| Nebraska | Renewable Energy Tax Credit | 0 | No | No | Unclear (Homes)<br>No (Systems) | Maximum Incentive: None<br>Budget: $50,000 |
| New Mexico | Solar Market Development Tax Credit | 2 | Yes (up to ten years) | No | No (Homes)<br>No (Systems) | Maximum Incentive: $9,000 per system.<br>Budget: $2 million for solar thermal and $3 million for photovoltaic systems annually. Credits granted on a first-come, first-served basis. |
| New Mexico | Geothermal Heat Pump Tax Credit | 2 | Yes (up to ten years) | No | No (Homes)<br>N/A (Systems) | Maximum Incentive: $9,000 per system.<br>Budget: $2 million annually. Credits granted on a first-come, first-served basis. |
| New York | Residential Solar Tax Credit | 3 | Yes (up to five years) | No | No (Homes)<br>Yes (Systems) | Maximum Incentive: $5,000 for solar-energy systems placed in service on or after September 1, 2006.<br>Budget: No maximum budget. |
| New York | Refundable Clean Heating Fuel Tax Credit | 3 | No | Yes | N/A (Homes)<br>N/A (Systems) | Maximum Incentive: $0.20 per gallon.<br>Budget: No maximum budget. |
| South Carolina | Solar Energy and Small Hydropower Tax Credit | 2 | Yes (up to ten years) | No | No (Homes)<br>No (Systems) | Maximum Incentive: In any given tax year, a maximum of $3,500 or 50% of the taxpayer's tax liability for that taxable year, whichever is |

118. For all three Montana tax credits, the credit applies to the person who made the investment regardless of renter/owner status. Telephone Interview with Kathy Montgomery, Mont. Dep't of Envtl. Quality (Apr. 22, 2016). In addition, Kathy mentioned that Montana currently does not have any companies that lease solar systems. *Id.*

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | less.<br>Budget: No maximum budget. |
| Utah | Renewable Energy Systems Tax Credit | 2.5 | Yes (up to four years for purchased systems and seven years for leased systems) | No | No (Homes)<br>Yes (Systems) | Maximum Incentive: $2,000 per residential unit.<br>Budget: No maximum budget. |

Table 4. Federal and State Energy-Efficiency Tax Credits

| Entity | Program Title | Rating | Carryover | Refundable | Home Renters/ Rented Systems | Monetary Considerations |
|---|---|---|---|---|---|---|
| United States | Residential Energy Efficiency Tax Credit | 0 | No | No | No (Homes)<br>N/A (Systems) | Maximum Incentive: For purchases made from 2011 to 2016, the credit is limited to $500.<br>Budget: No maximum budget. In 2011 and 2012, the federal government spent $755 million and $449 million respectively on this program.[119] |
| Montana | Energy Conservation Installation Credit | 1 | No | No | Yes (Homes)<br>N/A (Systems) | Maximum Incentive: $500 per individual and up to $1,000 for a married couple filing jointly.<br>Budget: No maximum budget. |
| South Carolina | Energy Efficient Manufactured Homes Incentive Tax Credit | 0 | No | No | No (Homes)<br>N/A (Systems) | Maximum Incentive: $750<br>Budget: No maximum budget. |

119. Borenstein & Davis, *supra* note 19, at 10.

| | | | | | | |
|---|---|---|---|---|---|---|
| Virginia | Richmond Department of Public Utilities: Energy Conservation Credits | 1 | No | No | Yes (Homes) N/A (Systems) | Maximum Incentive: From $50 to $500 based on technology. Budget: No maximum budget. |

Table 5. Federal and State Renewable-Energy & Energy-Efficiency Tax Credits

| Entity | Program Title | Rating | Carryover | Refundable | Home Renters/ Rented Systems | Monetary Considerations |
|---|---|---|---|---|---|---|
| New Mexico | Sustainable Building Tax Credit | 2 | Yes (up to seven years) | No | No (Homes) N/A (Systems) | Maximum Incentive: Varies Budget: $4 million annually through 2016; $3.375 million annually through 2026. |
| Oregon | Residential Energy Tax Credit | 4 | Yes (up to five years) | No | Yes (Homes) Yes (Systems) | Maximum Incentive: $750 to $6,000 based on technology. Budget: No maximum budget. |

The 2 federal credits scored as some of the most regressive of the 23 total credits. The federal credits do not apply to rental housing, neither credit is refundable, and only one credit can be carried forward and even then, only up to one year.[120] In contrast, three state credits are refundable and two-thirds of the state provisions (14 total) allow excess credits to carry over.[121] Most of these credits can be carried forward for five years or more.[122] Overall, the state credits are more progressive than the federal credits in this area.

120. *See supra* Tables 3–5 (indicating that both federal credits do not apply to rental housing, are non-refundable, and only one credit can be carried forward for up to one year).

121. *See supra* Tables 3–5 (showing which states provide refundable energy tax credits); *see also DSIRE*, *supra* note 83 (providing data on state and federal tax incentives).

122. *See supra* Tables 3–5 (showing that of the 14 state tax credits listed that allow carryover, 11 may be carried forward for five or more years).

The regressivity of federal programs may be particularly concerning if significant monetary scale differences exist between federal and state programs. In 2013, for example, the two federal programs were responsible for over $1.6 billion in expenditures[123]—equivalent to approximately $5 per person in the United States.[124] In contrast, 6 of the 21 state programs have budgetary caps ranging from $50,000 per year to $10 million per year.[125] Per capita expenditure estimates for these programs range from $0.02 per person in Nebraska[126] to $2.15 per person in Louisiana[127] and $5.27 per person in New Mexico.[128] The remaining 15 state programs do not include any budgetary limits.[129] Unfortunately, these state governments do not release information about how much they actually spend on the tax credits, making monetary comparison to the federal programs difficult.[130]

### 3. Property Tax Incentives

Many states also offer a variety of renewable-energy and energy-efficiency property tax incentives.[131] Currently, 32 states (and local governments within those states),[132] Washington, D.C., Puerto Rico, and the

123. *See* INDIVIDUAL INCOME TAX RETURNS 2013, *supra* note 3, at 142 (showing that residential energy credits alone exceeded $1.6 billion).

124. The population of the United States was approximately 316.5 million in 2013. *U.S. and World Population Clock*, U.S. CENSUS BUREAU, http://www.census.gov/popclock/ [https://perma.cc/Z8AU-JJLY] (last visited Mar. 11, 2017).

125. *See supra* Tables 3–5.

126. Nebraska has a budgetary cap of $50,000 and a population of 1.882 million. *See supra* Table 3 (indicating Nebraska's budgetary cap of $50,000); *see also QuickFacts: Nebraska*, U.S. CENSUS BUREAU, http://www.census.gov/quickfacts/chart/AGE295213/31 [https://perma.cc/6CBY-VLQK] (last visited Mar. 11, 2017) (illustrating Nebraska has a population of just over 1.9 million).

127. Louisiana has a budgetary cap of $10 million and a population of 4.65 million. *QuickFacts: Louisiana*, U.S. CENSUS BUREAU, http://www.census.gov/quickfacts/table/EDU635213/22 [https://perma.cc/GF8L-RQZA] (last visited Apr. 30, 2016).

128. Half the caps are for New Mexico's three programs for a combined budget cap of $11 million per year. *See supra* Tables 3–5 (listing New Mexico's budgetary caps). New Mexico has a population of 2.08 million. *See QuickFacts: New Mexico*, U.S. CENSUS BUREAU, http://www.census.gov/quickfacts/table/PST045215/35 [https://perma.cc/MW5N-8X64] (last visited Mar. 2, 2017) (listing New Mexico's population as 2.8 million).

129. *See supra* Tables 3–5; *see also DSIRE*, *supra* note 83.

130. I attempted to get this information from several states, including New York. However, New York and other states do not collect this tax expenditure information.

131. State and local governments levy property taxes. Therefore, there are not any comparable federal incentives. It should be noted that, by definition, someone must own property to qualify for these incentives. Therefore, renters are by definition excluded.

132. The states include Alaska, Arizona, California, Colorado, Connecticut, Florida, Hawaii, Iowa, Illinois, Indiana, Kansas, Louisiana, Massachusetts, Maryland, Minnesota, Missouri, Montana, North Carolina, North Dakota, New Hampshire, New Jersey, New Mexico, Nevada, New York, Ohio, Rhode Island, South Dakota, Tennessee, Texas, Virginia, Vermont, and Wisconsin. Many of the enactment dates are much earlier for these property tax incentives. *See generally DSIRE*, *supra* note 83 (listing renewable-energy and energy-efficiency property tax incentives by state).

Virgin Islands offer at least 61 renewable-energy and energy-efficiency property tax incentives.[133] The majority of the property tax incentives focus on renewable-energy: 46 incentives cover renewable energy, 2 focus exclusively on energy efficiency, and 13 cover both renewable energy and energy efficiency.

Of the 46 renewable-energy incentives, an additional majority of the incentives either create a statewide property tax exemption for renewable-energy systems or authorize local governments to pass ordinances that do the same. In other words, for property tax assessment purposes, renewable-energy systems add no value to the property. Overall, 41 incentives—two-thirds of the total incentives available—establish some form of renewable-energy property tax exemption.[134] Many of the energy-efficiency measures also take the form of property tax exemptions for energy conservation devices or energy-efficient buildings (often defined according to national or state standards, such as the Leadership in Energy and Environmental Design standard).[135]

A few states and local governments offer a renewable-energy or energy-efficiency property tax abatement or property tax credit instead of, or in addition to, a property tax exemption. For example, New York City allows taxpayers to deduct installation costs of a solar photovoltaic system from their real property taxes.[136] Maryland, on the other hand, offers local renewable-energy and energy-efficiency property tax credits—the only state to do so.[137]

From a distributional perspective, the structure of these property tax programs matters less because governments frequently fix property tax rates to fair-market value of the property rather than income. More significantly, however, these subsidies only apply to owners and therefore, may be a significant grant of taxpayer dollars to wealthier individuals. Unfortunately, I was unable to find any information regarding the amount of money flowing through these programs and which families benefit most. Future research is needed in this area.

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133. *Id.*

134. Renewable energy property owners can take advantage of these tax exemptions for varying lengths of time, ranging from five years or less to indefinitely.

135. *Local Option – Real Property Tax Exemptions*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program?type=78&category=1& [https://perma.cc/YE4E-W2WB] (last visited March 11, 2017). For example, New York exempts household energy-conservation improvements and certain "green" buildings from real property taxes.

136. *Solar Energy System Equipment Credit*, N.Y. STATE DEP'T TAXATION & FIN. (Dec. 11, 2013), https://www.tax.ny.gov/pit/credits/solar_energy_system_equipment_credit.htm [https://perma.cc/X8XP-DCXU].

137. *See DSIRE*, *supra* note 83 (use the filters to select Maryland and property tax incentive). Many of these credits can be carried forward.

### *B. Alternative-Vehicle and -Fuel Tax Incentives*

Fifteen states,[138] the federal government, and Washington, D.C., currently offer 29 alternative-vehicle and -fuel tax incentives.[139] The federal government offers 3 incentives, state governments offer 24 incentives, and Washington, D.C., offers 2 incentives.[140] From a structural perspective, half of the incentives (14 total) take the form of an income tax credit—a slightly lower proportion than in the renewable-energy and energy-efficiency context.[141]

Twelve of the remaining 15 incentives take the form of a tax exemption (e.g., for excise tax, sales tax, use tax, and gas tax, among others).[142] For example, Washington exempts natural gas used as a transportation fuel from state and local sales, use, and public utility taxes.[143] The final three incentives take some other format (e.g., a reduced license tax, reduced sales tax, and reduced fuel tax), which apply equally across income groups.[144] Because the tax exemptions and reduced taxes involve more minor dollar amounts and no large structural choices, the next subsection will primarily focus on vehicle tax credits.

#### Tax Credits

The majority of the tax credits available apply toward the purchase or lease of an alternative-fuel vehicle or conversion of an existing vehicle to an alternative-fuel vehicle. Eleven of the 14 tax credits apply toward the purchase, lease, or conversion price of an alternative-fuel vehicle, including all 3 federal tax credits.[145] Several of these credits also apply to the purchase and installation of charging equipment.[146] Two additional credits

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138. The states include Arizona (three incentives), California, Colorado (two incentives), Indiana, Louisiana, Maryland (two incentives), Montana, New Jersey (two incentives), Oklahoma (three incentives), Oregon, Rhode Island, South Carolina, South Dakota, Utah (two incentives), Washington (two incentives), West Virginia, and Wisconsin (two incentives). *See infra* Table 6 (listing vehicle tax incentives).

139. *Id.*; *see also DSIRE*, *supra* note 83 (providing data on state tax incentives).

140. *See infra* Table 6 (describing federal and state vehicle tax incentives).

141. *Id.*

142. *Id.*; *see also State Laws and Incentives*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/laws/state [https://perma.cc/KT6F-8VKT] (last visited May 15, 2017) (detailing states' fuel tax incentives).

143. WASH. REV. CODE §§ 82.08.809, 82.12.809 (2016).

144. *See infra* Table 6 (indicating that Arizona has a reduced license tax, New Jersey has a reduced sales tax, and Utah has a reduced fuel tax).

145. *See infra* Table 6 (characterizing 12 state vehicle incentives as tax credits).

146. *See infra* Table 6 (detailing programs in Arizona, Louisiana, Maryland, and Washington, D.C., that provide for purchase or installation of charging equipment).

offered by Arizona and Maryland apply solely toward the installation of electric-vehicle equipment.[147] The remaining credit—offered by Maryland—applies against the excise tax (up to $3,000) for plug-in electric vehicles.[148]

Similar to Part IV(A)(2), I rate the credits according to the following progressivity point system: three points for refundable credits, two points for credits that can be carried forward for five years or more, one point for credits that can be carried forward for less than five years, and one point for credits that apply to leased cars, yielding a maximum four points possible. I code subsidies with a score of 0 as regressive (red); scores of 1–2 as mixed (yellow); and scores of 3–4 as progressive (green). As before, this measure is of course not a definitive quantitative ranking. However, it presents a useful way to compare various incentives. The following chart summarizes the programs. Where possible, I include monetary data in the last column.

Table 6. Federal and State Vehicle and Fuel Tax Incentives[149]

| Entity | Title | Rating | Carryover | Refundable | Car Renters Eligible | Monetary Considerations |
|---|---|---|---|---|---|---|
| United States | Qualified Two-Wheeled Plug-In Electric Drive Motor Vehicle Credit | 0 | No | No | No | Maximum Incentive: $2,500<br>Budget: No maximum budget. In 2012 and 2013, the federal government spent $4.8 million and $760,000 respectively on this program.[150] |
| United States | Fuel Cell Motor Vehicle Credit | 0 | No | No | No | Maximum Incentive: $8,000<br>Budget: No maximum budget. In 2011, 2012, |

147. *Arizona Laws and Incentives for Electricity*, U.S. DEP'T ENERGY (Nov. 20, 2016), http://www.afdc.energy.gov/fuels/laws/ELEC/AZ [https://perma.cc/EFB9-QY9Y]; *Maryland Laws and Incentives for Electricity*, U.S. DEP'T ENERGY (Jan. 3, 2017), http://www.afdc.energy.gov/laws/all?state=MD [https://perma.cc/95Q3-T2PK].

148. *Titling - Excise Tax Credit for Plug-in Electric Vehicles*, MD. DEP'T TRANSP., http://www.mva.maryland.gov/about-mva/info/27300/27300-71T.htm [https://perma.cc/68NW-UBDM] (last visited May 15, 2017).

149. The information included in Table 6 is based on data from the Alternative Fuels Data Center. *See supra* text accompanying note 88 (for information on methodology).

150. Borenstein & Davis, *supra* note 19, at 10–11; INDIVIDUAL INCOME TAX RETURNS 2013, *supra* note 3.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | and 2013, the federal government spent $14 million, $20 million, and $12.5 million on this program respectively.[151] |
| United States | Qualified Plug-In Electric Drive Motor Vehicle Credit | 0 | No | No | No | Maximum Incentive: $7,500<br>Budget: No maximum budget but phased out after 200,000 purchases per manufacturer. In 2011, 2012, and 2013, the federal government spent $76 million, $139 million, and $231 million on this program respectively.[152] |
| Arizona | Residential Electric Vehicle Supply Equipment Credit | 1 | No | No | Yes | Maximum Incentive: $75<br>Budget: No maximum budget. |
| Colorado | Alternative Fuel, Advanced Vehicle, & Idle Reduction Technology Credit | 4 | No | Yes | Yes | Maximum Incentive: Varies based on category, vehicle weight, and tax year.<br>Budget: Annual credit caps for each technology type and vehicle weight class, and for cumulative annual credits. |
| Louisiana | Alternative Fuel Vehicle & Fueling Infrastructure Credit | 3 | No | Yes | No | Maximum Incentive: No limit on conversion; limit of $1,500 for new cars.<br>Budget: No maximum budget. |
| Maryland | Electric Vehicle Supply Equipment | 0 | No | No | N/A | Maximum Incentive: $400 ($900 for rebate system).[153] |

151. *Id.*
152. *Id.*
153. *Electric Vehicle Supply Equipment (EVSE) Rebate Program*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/laws/11423 [https://perma.cc/C9NW-X7MM] (last updated Jan. 3, 2017).

| | | | | | | |
|---|---|---|---|---|---|---|
| | Credit | | | | | Budget: $600,000 per year. |
| Maryland | Plug-In Electric Vehicle Credit | 4 | No | Yes (returned as a check) | Yes | Maximum Incentive: $3,000<br>Budget: No maximum budget. |
| Montana | Alternative Fuel Vehicle Conversion Credit | 0 | No | No | No | Maximum Incentive: $500<br>Budget: No maximum budget. |
| Oklahoma | Alternative Fuel Vehicle Credit | 2 | Yes (up to five years) | No | No | Maximum Incentive: No limit in certain circumstances; $1,500 limit in others.<br>Budget: No maximum budget. |
| South Carolina | Plug-In Hybrid Electric Vehicle Credit | 3 | Yes (up to five years) | No | Yes | Maximum Incentive: $2,000<br>Budget: $200,000 per year, available on a first-come, first-served basis. |
| Utah | Alternative Fuel & Fuel-Efficient Vehicle Credit | 1 | No | No | Yes | Maximum Incentive: $1,000 for plug-in hybrids; $1,500 for electric, natural gas and propane vehicles; $2,500 for vehicles conversions.<br>Budget: No maximum budget. |
| Washington, D.C. | Alternative Fuel Vehicle & Infrastructure Credit | 2 | Yes (up to two years) | No | Yes | Maximum Incentive: $19,000 for vehicle; $1,000 for charging equipment.<br>Budget: No maximum budget. |
| West Virginia | Alternative Fuel Vehicle Credit | 1 | Yes (up to four years) | No | No | Maximum Incentive: $7,500<br>Budget: No maximum budget. |

This program was changed to a rebate system in 2014. *Id.* For systems purchased on or after July 1, 2014, the Electric Vehicle Supply Equipment Rebate Program applies instead. *Id.* This rebate program is more generous than the credit program. *Id.* The rebate is worth 50% of the purchase and installation cost up to $900. *Id.*

As in the renewable-energy and energy-efficiency context, state programs appear to be more progressive than their federal counterparts. Many of the state-level tax credits have more inclusive categories of eligibility. Six of the state credits apply to both owners and lessees.[154] In contrast, all three federal credits exclude lessees of vehicles.[155] Many of the state tax credits also include excess credit provisions. Four state credits include carryover provisions, three state credits are refundable, and one government immediately returns tax credits to taxpayers in the form of a check.[156] In contrast, taxpayers cannot carry forward or refund credits for any of the federal programs—all of the credits must be used in the year of purchase to offset tax liability or not at all.[157]

Again, the regressivity of federal programs may be particularly concerning if significant monetary scale differences exist between federal and state programs. In 2012, for example, the federal government spent over $163.8 million on the above three vehicle tax credit programs[158]—equivalent to approximately $0.52 per person in the United States.[159] At the state level, 3 of the 11 state programs have budgetary caps.[160] For example, South Carolina capped their program at $200,000 per year, equivalent to a per capita expenditure of $0.04.[161] The remaining state programs do not include any budgetary limits. Similar to the renewable-energy and energy-efficiency context, information as to how much governments actually spend on the tax credits in these states is not available, making comparison to the federal programs difficult.[162]

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154. *See supra* Table 6.

155. *Id.*

156. *Id.* (indicating that Oklahoma, South Carolina, Washington, D.C., and West Virginia have carryover provisions; that Colorado, Louisiana, and Maryland have refundable credits; and that Maryland returns tax credits in the form of a check).

157. *See supra* Table 6.

158. Borenstein & Davis, *supra* note 19, at 10.

159. The population of the United States was approximately 316.5 million in 2013. *U.S. and World Population Clock*, *supra* note 124.

160. *See supra* Table 6 (outlining budgetary caps associated with state vehicle tax incentives); *see also DSIRE*, *supra* note 83 (providing data on state and federal tax incentives).

161. *Application for Plug-In Hybrid Vehicle Credit*, S.C. DEP'T REVENUE, http://www.energy.sc.gov/files/view/sc-sch-tc-48a-form.pdf [https://perma.cc/6K3J-HZBW] (last visited March 8, 2017). South Carolina has a population of 4.832 million. *QuickFacts: South Carolina*, U.S. CENSUS BUREAU, http://www.census.gov/quickfacts/table/PST045215/45 [https://perma.cc/PF3T-GUD8] (last visited Mar. 3, 2017).

162. Again, I attempted to collect this information from several states; however, it was unavailable.

## V. REFORMING SUBSIDIES TO REACH LOW- AND MIDDLE-INCOME FAMILIES

As indicated in Part IV, many current tax subsidies—in particular, federal tax subsidies—include regressive structures. Data from the Internal Revenue Service indicate that regressive structures result in distributional consequences.[163] For example, from 2006 to 2012, the top 40% of households received over 90% of all federal tax credit dollars for the federal renewable-energy, energy-efficiency, and alternative-vehicle subsidies discussed above.[164] Regressive subsidies may not achieve their full potential in terms of impact, efficiency, and cost-effectiveness. Federal and state governments should reform regressive subsidies to improve the cost-effectiveness and efficiency of the programs, garner broader political support, and assuage income inequality concerns under existing structures.

This section proposes several ways to achieve these goals. Because governments cannot reform the structure of deductions and property tax incentives other than by switching to a new format entirely (i.e., a credits structure), this section focuses solely on how governments can reform existing tax credits.[165] In particular, the section examines three major issues currently preventing low- and middle-income families from taking advantage of existing credits: (1) non-refundability of credits; (2) principal–agent issues in the landlord–tenant context; and (3) high upfront costs of renewable-energy systems, energy-efficiency improvements, and alternative-fuel vehicles. Several state programs incorporate innovative solutions to these issues. This section highlights best practices from state programs and discusses alternate ways governments can combat these three obstacles.

### *A. Refundability and Carry-Forward Provisions: Ensuring All Families Have Access to the Same Amount in Credits*

Non-refundable tax credits exclude many low- and middle-income families. In 2012, for example, 36% of taxpayers[166] had no positive tax

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163. *See* INDIVIDUAL INCOME TAX RETURNS 2013, *supra* note 3, at 29–31 (illustrating the distribution of returns based on income).

164. The top 20% of households received 60% of the credit dollars. Borenstein & Davis, *supra* note 19, at 1.

165. *See Tax Credits vs. Tax Deductions*, U.S. TAX CTR., https://www.irs.com/articles/tax-credits-vs-tax-deductions [https://perma.cc/43LH-FATZ] (last visited Mar. 11, 2017) (discussing differences between tax credits and tax deductions).

166. Overall, 51.8 million out of 144.9 million tax returns had no tax liability. Borenstein & Davis, *supra* note 19, at 24; *see also* Neveu & Sherlock, *supra* note 18, at 63 (noting that an estimated 46% of households had no income tax liability in 2011).

liability.[167] Among those with less than $20,000 in adjusted gross income, approximately 85% had no tax liability.[168] Many other taxpayers had limited positive tax liability.[169] These statistics indicate that over a third of taxpayers cannot take advantage of any of the federal renewable-energy, energy-efficiency, and alternative-vehicle tax credits due to structural limitations. Many more taxpayers can only claim partial credit. Many of these same taxpayers also would not be able to take advantage of the various state credits.[170]

Several state credits offer models for how governments can reform existing climate-change tax credits to ensure that all families can take advantage of the credits, regardless of income.[171] Louisiana and Hawaii offer models in the renewable-energy and energy-efficiency context. Louisiana's Tax Credit for Solar Energy Systems on Residential Property, for example, includes a standard refundability provision.[172] This provision states that the government will refund any excess credits—up to the full incentive amount of $10,000 for customer-owned systems and $7,600 for leased systems—that exceed the taxpayer's liability for that year.[173]

Hawaii offers an example of an alternative, tiered model. Under Hawaii's Renewable Energy Technologies Income Tax Credit, the government refunds excess credits under certain conditions.[174] For individuals whose income is tax-exempt or with an adjusted gross income of $20,000 or less ($40,000 or less for married couples filing jointly), the taxpayer can elect to either receive excess credits as a refund or carry

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167. Borenstein & Davis, *supra* note 19, at 24.

168. *Id.*

169. *Id.*

170. Only three state renewable-energy and energy-efficiency credits are refundable; however, two-thirds of the state credits can be carried forward.

171. As one author commented, there is no "coherent economic argument for making these credits non-refundable. From an efficiency perspective, there is nothing fundamentally different between filers with positive and negative tax liability, and from a distributional perspective, restricting the credits to exclude taxpayers without tax liability decreases both horizontal and vertical equity." Borenstein & Davis, *supra* note 19, at 25; *see also* Batchelder et al., *supra* note 41, at 50 (arguing that all tax incentives should be refundable tax credits). By way of comparison, many other federal tax credits are refundable, such as the Earned Income Tax Credit, Making Work Pay Credit, Child Tax Credit, and the First-Time Home Buyer Credit. Borenstein & Davis, *supra* note 19, at 20. All of these have lower concentration indexes, indicating a more equitable distribution of the credits. *Id.*

172. *See supra* Table 3 (indicating that Louisiana offers a refundability provision for residential solar energy systems).

173. *See Tax Credit for Solar Energy Systems on Residential Property (Personal)*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program/detail/2636 [https://perma.cc/292P-B48K] (last updated Oct. 6, 2016) (describing tax credit for solar energy systems on residential property).

174. *See Solar and Wind Energy Credit (Personal)*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program/detail/50 [https://perma.cc/G4AP-H5BP] (describing the conditions under which Hawaii will refund).

forward the credits until they are exhausted.[175] For all other taxpayers who do not meet these criteria, the taxpayer can elect to reduce the eligible credit amount by 30%, and if this amount still exceeds the taxpayer's tax liability for that year, the government will refund excess credits to the taxpayer.[176] Alternatively, the taxpayer can elect to retain the full credit amount and carry forward any excess credits until the credits are exhausted.[177]

In the alternative-vehicle context, Colorado, Louisiana, and Maryland provide models for reform. Colorado and Louisiana include standard refundability provisions: all excess credits will be refunded to the taxpayer.[178] Maryland takes refundability one step further by offering a rebate-like tax credit program.[179] One downside to the tax credit model is that families must wait until the following year when they file taxes to receive the credit. For cash-constrained families, this waiting period may pose an obstacle to adoption. To counteract family credit constraints, Maryland's Plug-In Electric Vehicle Tax Credit allows taxpayers to submit an application and receive their credit immediately in the form of a check from the state.[180] While a tax credit in name, this program functions more like a rebate program.

The additional budgetary costs that refundable tax credits impose on federal and state governments may act as a potential barrier to reform. Although equity and efficiency considerations counsel against this worry, again, state programs offer models for how to minimize additional budgetary costs and/or better target subsidies to only capture individuals who would not make the technology transition without the tax subsidy.

To minimize budget costs, Colorado sets annual budget limits. Colorado offers a tiered alternative-vehicle tax credit based on the type of vehicle, the vehicle weight, and the tax year.[181] Colorado sets annual credit caps for each technology type and vehicle weight class as well as for cumulative annual credits.[182] In addition, to reduce costs further, the government subtracts all federal credits, grants, and rebates from the

175. HAW. REV. STAT. § 235-12.5 (2016).

176. *Id.*

177. *See Solar and Wind Energy Credit (Personal)*, *supra* note 174 (offering an overview of solar- and wind-energy credit programs).

178. *See supra* Table 6 (indicating that Colorado and Louisiana offer standard refundability provisions for alternative fuel vehicles).

179. *See supra* Table 6.

180. *See supra* text accompanying notes 87–88 (describing Maryland's laws and incentives for alternative vehicles).

181. *Alternative Fuel Tax Credit*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/laws/11704 [https://perma.cc/GD5E-2KEX] (last visited Apr. 16, 2017).

182. COLO. DEP'T OF REVENUE, INCOME 67: INNOVATIVE MOTOR VEHICLE CREDIT FOR TAX YEARS 2015-2016, at 1–2 (2017), https://www.colorado.gov/pacific/sites/default/files/Income67.pdf [https://perma.cc/K6SA-PQB2].

vehicle cost before applying the relevant percentage calculation to determine the appropriate state credit award.[183]

In the rebate context, California regulators recently limited rebates for the purchase or lease of hybrid or electric vehicles to individuals who earn less than $250,000 or couples who earn less than $500,000.[184] This change simultaneously reduces the program's budget costs and increases the cost-effectiveness of the program.[185] The California Air Resources Board may add additional eligibility caps based on income and may raise subsidy amounts for low- and moderate-income consumers.[186]

Similar income caps and tiered credit amounts could be introduced for tax credits.[187] For example, in the alternative vehicle context, tax credits could incorporate tiered categories of incentives and phase-out levels, such as the following:

| Income Category | Own or Lease Car | Credit Amount |
|---|---|---|
| **$0-$20,000** | Own | 75% of the incremental cost |
| **$20,000-$50,000** | Own | 50% of the incremental cost |
| **$50,000-$100,000** | Own | 25% of the incremental cost |

183. *See supra* text accompanying notes 87–88 (indicating that taxpayers in Colorado must subtract credits, grants, or rebates from the MSRP of an alternative vehicle before applying the relevant percentage calculation). Another option in the alternative-vehicle context is for tax credits to target incremental costs only. For example, Louisiana's Alternative Fuel Vehicle and Fueling Infrastructure Tax Credit offers taxpayers a choice of credit options: a taxpayer may either claim an income tax credit worth 36% of the cost of converting a vehicle to operate on alternative fuel, a tax credit worth 36% of "the incremental cost" of purchasing an alternative-fuel vehicle, or a tax credit worth 7.2% of the total cost of the motor vehicle, up to $1,500. LA. STAT. ANN. § 47:6035 (2015) (indicating that purchasers of alternative vehicles in Louisiana have two tax credit options).

184. Patrick McGreevy, *California Limits Hybrid Rebates to Households Earning Less Than $500,000*, L.A. TIMES (Aug. 23, 2015, 5:56 PM), http://www.latimes.com/local/politics/la-me-pol-electric-cars-20150824-story.html [https://perma.cc/GTX3-WPA6]. California was responding to the fact that high-income earners have received the majority of the subsidies so far. *Id.* As of August 2015, the program had provided $242 million in rebates to 114,702 people. *Id.* A survey of 15,432 rebate recipients found that as of May 2015, 6% had incomes of $500,000 or more, 28% had incomes of $200,000–$499,000, 43% had incomes of $100,000–$199,000, and only 23% had incomes below $99,000. *Id.* By way of comparison, the average household income in California is $60,000. *Id.* Approximately 15% of those surveyed said they bought a Tesla with a starting price of $75,000 before rebates. *Id.* As Michelle Kinman, an advocate for Environment California, summarized that "[t]here are a good number of people for whom the rebates were not the driver of that purchase. They would have made the purchase without the rebates." *Id.*

185. Although the change may shift some buyers away from buying electric vehicles on the margin, overall, it will ensure limited public dollars go to those who need them most. *Id.*

186. *Id.*

187. Notably, the federal government already includes similar income caps for other tax credit programs, such as the Earned Income Tax Credit. *See Earned Income Tax Credit (EITC)*, INTERNAL REVENUE SERV., https://www.irs.gov/credits-deductions/individuals/earned-income-tax-credit [https://perma.cc/Z3ZE-SP89] (last visited Mar. 3, 2017) (describing how the EITC benefits low- to moderate-income taxpayers).

| | | |
|---|---|---|
| **$100,000-$500,000** | Own | 10% of the incremental cost |
| **$0-$20,000** | Lease | $100 per year for three years |
| **$20,000-$50,000** | Lease | $75 per year for three years |
| **$50,000-$100,000** | Lease | $50 per year for three years |
| **$100,000-$500,000** | Lease | $25 per year for three years |

High-income families may be incentivized by lower credit amounts. The above tiered tax credit structure reflects this possibility, offering higher credit amounts for lower-income groups.[188] In turn, this model would also limit government expenditures to the incentives needed to encourage the technology transition.

In addition to or instead of tiered tax credit categories, tax credits could also incorporate differing sunset provisions based on the number of people who use the subsidy by income group. For example, credits could expire for individuals in the $100,000 to $500,000 income category after 10,000 people claim the credit but expire after 190,000 people claim the credit in the $99,000 or below income category.[189] This program design would cap tax expenditures while also guaranteeing that governments distribute subsidy dollars across income categories.

### *B. Combatting Principal–Agent Issues in the Landlord–Tenant Context*

Principal–agent problems often cause landlords to underinvest in renewable-energy and energy-efficiency measures.[190] Landlords have no reason to invest in clean-energy or energy-reduction measures because renters often pay for their own utilities.[191] These split incentives make it

188. Schizer, *supra* note 16, at 30. Alternatively, as Schizer argues, tax credits could be offered based on the vehicle's miles per gallon. *Id.* A similar tiered tax credit structure could be created with higher credits offered for more fuel-efficient vehicles (e.g., 60+ mpg) and for lower-income groups. *Id.*

189. Federal vehicle tax credits currently expire after 200,000 individuals (regardless of income category) per vehicle type take advantage of them. I.R.C. § 30D (2012); *Plug-In Electric Drive Vehcile Credit (IRC 30D)*, INTERNAL REVENUE SERV., https://www.irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d [https://perma.cc/QH2M-7VBP] (last updated Feb. 8, 2017).

190. *See* Borenstein & Davis, *supra* note 19, at 25; Lucas W. Davis, *Evaluating the Slow Adoption of Energy Efficient Investments: Are Renters Less Likely to Have Energy Efficient Appliances?*, *in* THE DESIGN AND IMPLEMENTATION OF U.S. CLIMATE POLICY 301, 301–02 (Don Fullerton & Catherine Wolfram eds., 2012); Kenneth Gillingham et al., *Split Incentives in Residential Energy Consumption*, 33 ENERGY J. 2, 37–38 (2012); Erica Myers, *Asymmetric Information in Residential Rental Markets: Implications for the Energy Efficiency Gap* 1 (Energy Inst. at Haas, Working Paper No. 246, 2013), https://ei.haas.berkeley.edu/research/papers/WP246.pdf [https://perma.cc/8FZZ-VMNP].

191. Marlene Cimons, *How Low-Income Households Can Take Advantage of Renewable Energy and Efficiency*, THINKPROGRESS (May 13, 2016), https://thinkprogress.org/how-low-income-households-can-take-advantage-of-renewable-energy-and-efficiency-78f63fdb70c9 [https://perma.cc/8VSU-P4W4].

difficult for governments to encourage adoption of renewable-energy systems and energy-efficiency measures in rental housing.[192] However, "excluding this sector altogether misses a large share of the housing stock and makes [renewable-energy and energy-efficiency tax] credits less equitable."[193]

Several states address this issue by expanding eligibility categories. For example, Oregon's Residential Energy Tax Credit is available to both homeowners and renters.[194] Any taxpayer who invests in qualified heating, energy-efficiency or renewable-energy systems may claim the credit.[195]

To match landlord–tenant split incentives, governments could also offer split tax credits. For example, for a purchased solar system, the federal government could offer a one-time $50 tax credit to the current renter in addition to the current 30% credit available to the landlord as owner of the home. For a leased solar system, the government could offer a split tax credit, with the renter and landlord each receiving part of the credit (assuming the renter pays for electricity). These split credits could encourage both parties to pressure the other to switch to renewable-energy systems.

### *C. Alleviating High Upfront Costs of Renewable-Energy Systems and Alternative Vehicles*

Many renewable-energy systems and alternative vehicles come with high initial costs.[196] These initial costs can act as a barrier to adoption among low- and middle-income households. Expanding credits to include leased renewable-energy systems and leased alternative vehicles can lower initial investment costs, leading to more widespread deployment of renewable-energy systems and low-carbon cars. For example, buying a solar system from Solar City can cost upwards of $7,400 (before credits) for their smallest system.[197] In contrast, leasing one of their solar systems

192. Roger Valdez, *Split Incentive Stalls Energy Efficiency in Rental Housing*, SIGHTLINE INST. (Apr. 27, 2009, 10:20 AM), http://www.sightline.org/2009/04/27/split-incentive-stalls-energy-efficiency-in-rental-housing/ [https://perma.cc/6BPW-P5S3].

193. Borenstein & Davis, *supra* note 19, at 25.

194. *Residential Energy Tax Credit*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program/detail/638 [https://perma.cc/ZF6L-EQ69] (last updated June 6, 2016) (indicating that Oregon has expanded eligibility by offering efficiency and renewable-energy system tax credits to both homeowners and renters).

195. *Alternative Fueling Infrastructure Tax Credit for Residents*, U.S. DEP'T ENERGY, http://www.afdc.energy.gov/laws/5315 [https://perma.cc/BD2Y-9Y9B] (last updated Jan. 3, 2017).

196. Spector, *supra* note 69 (describing how electric cars, energy efficiency, and renewable energy installations have high initial costs).

197. Telephone interview with Jason Stevens, Representative, Solar City (Apr. 10, 2016).

costs $0 down plus low monthly payments.[198] Leasing is also cheaper and increasingly common for alternative vehicles.[199] A 2012 survey of 3,800 households with a new plug-in hybrid or all-electric vehicle found that 29% of households leased their vehicle.[200] Incorporating leased renewable-energy systems and vehicles into tax credits can encourage individuals who cannot afford the high upfront purchase costs of these technologies to make the transition.

States offer several models for how governments can incorporate leased systems into tax credits. Louisiana and New York provide examples in the renewable-energy and energy-efficiency space. Louisiana's credit applies to both customer-owned solar photovoltaic systems and leased systems.[201] For customer-owned solar systems, taxpayers can claim a credit worth the lesser of $2.00 per watt, 50% of the cost of purchase and installation, or $10,000.[202] For leased solar photovoltaic systems, taxpayers can claim $2.00 per watt up to $4,560.[203] For New York's Residential Solar Tax Credit, taxpayers may claim a credit of 25% for the cost of a purchased or leased solar-electric and/or solar-thermal system.[204] For leased systems, taxpayers may claim the credit toward the amount of the lease or power-purchase agreement payments made during each year for up to 15 years.[205] The lease or power-purchase agreement must be at least ten years in length.[206]

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198. *Id.* Instead, customers lease the system at a set rate or sign a 20-year power purchase agreement. *Id.* Under the power purchase agreement option, lessees pay Solar City monthly for the amount of energy they use, often at a reduced rate per kWh. *Id.* For example, a customer in New Haven who currently pays $0.207 per kWh could pay $0.165 per kWh after leasing an 8-panel solar system from Solar City. *Id.* Solar City receives a 30% federal tax credit through the corporate income tax. *Id.* This federal tax credit, in part, allows Solar City to lease systems at reduced rates. *Id.*

199. From 2002 to 2007, less than 3.5% of Toyota Priuses were leased. James M. Sallee, *The Surprising Incidence of Tax Credits for the Toyota Prius*, 3 AM. ECON. J., 189, 192 n.4 (2011). In 2014, more than a quarter of new cars were leased instead of bought. Aaron M. Kessler, *Auto Leasing Gains Popularity Among American Consumers*, N.Y. TIMES (Jan. 8, 2015), https://www.nytimes.com/2015/01/09/business/auto-leasing-gains-popularity-among-american-consumers.html?_r=0 [https://perma.cc/HAK2-LFC6].

200. Tal & Nicholas, *supra* note 54, at 1, 8.

201. *Procedure for Claiming Louisiana Income Tax Credits for Solar Energy Systems*, LA. DEP'T REVENUE, http://www.rev.state.la.us/NewsAndPublications/ProcedureforClaimingLouisianaIncomeTaxCreditsforSolarEnergySystems [https://perma.cc/R5R4-FERA] (last visited Mar. 11, 2017).

202. *Tax Credit for Solar Energy Systems on Residential Property (Personal)*, *supra* note 173.

203. *Id.*

204. *Residential Solar Tax Credit*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program/detail/80 [https://perma.cc/F8SY-4DG2] (last updated Apr. 20, 2015).

205. *Id.*

206. *Id.*

Utah offers an example in the alternative vehicle context. Utah offers an income tax credit of 35% of the vehicle purchase price (up to $1,500) for the purchase of a new electric, natural-gas, or propane vehicle.[207] Leased electric, natural-gas, and propane vehicles are also eligible for the tax credit (up to $1,500) on a prorated basis.[208] Additionally, Utah offers a $1,000 income tax credit for the purchase or lease (prorated) of a plug-in hybrid electric vehicle.[209] Programs such as these allow families to get around high initial costs of renewable-energy systems and alternative vehicles, likely leading to more widespread deployment of these technologies.

### *D. Non-Tax Alternatives*

Instead of—or in addition to[210]—modifying existing energy tax incentives, governments could replace tax programs with non-tax policies, such as grant, rebate, and loan programs.[211] Grant and rebate programs provide money faster, mitigating some of the upfront cost issues, and do not require families to navigate the complexities of the tax code.[212]

An initial review of the DSIRE database indicates that a number of states have already adopted various alternative-funding mechanisms. States and the federal government currently offer (or at one time offered) 26 residential grant programs, 157 residential loan programs, 44 residential property assessed clean energy financing programs, and 847 residential

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207. UTAH CODE ANN. § 59-10-1009(2)(a)–(b) (LexisNexis 2016).

208. *Id.* § 59-10-1009(2)(d)(ii).

209. *Clean Fuels Program: Clean Fuel Vehicle Tax Credit*, UTAH DEP'T ENVTL. QUALITY, https://deq.utah.gov/ProgramsServices/programs/air/cleanfuels/taxcredits/2015/main.htm [https://perma.cc/QDU5-86RW] (last visited Mar. 3, 2017). Colorado's Innovative Motor Vehicle and Alternative Fuel Vehicle Credits also apply to leased vehicles. *See, e.g.*, COLO. DEP'T REVENUE, *supra* note 182, at 3–4. Colorado includes a more complex formula for calculating leased vehicle credits. *Id.*

210. Many tax incentives will likely be around for the foreseeable future. Although there are sunset provisions built into many of the tax incentives, Congress—and state governments—tends to renew many of these incentives as needed.

211. As of July 2014, Maryland moved from a tax credit to a rebate program for their electric vehicle supply equipment subsidy. *See supra* Table 6. As another example, the California Bureau of Automotive Repair's Consumer Assistance Program pays low-income owners (225% of federal poverty level) of certain high-emission vehicles $1,500 to retire their vehicle early from operation. *Consumer Assistance Program*, CAL. BUREAU AUTOMOTIVE REPAIRS, http://www.smogcheck.ca.gov/consumer/Consumer_Assistance_Program/index.html [https://perma.cc/XW5V-M6EX] (last visited May 2, 2017).

212. *See generally* Severin Borenstein, *Private Net Benefits of Residential Solar PV: The Role of Electricity Tariffs, Tax Incentives and Rebates* (Energy Inst. at Haas, Working Paper No. 259, 2015), https://ei.haas.berkeley.edu/research/papers/WP259.pdf [https://perma.cc/2VA4-BE4F] (indicating that residential solar is becoming more accessible due to lease and rebate programs). However, grants and rebates may come with additional budgetary costs, such as increased administrative costs.

rebate programs for renewable energy and/or energy efficiency.[213] A thorough analysis of these programs and other alternative funding arrangements is outside the scope of this article; however, non-tax alternatives are an important area for future research.

## CONCLUSION

Policymakers use the tax code as a vehicle for advancing their values and achieving their strategic aims. In the climate-change context, the federal government's values and objectives ring loud and clear: support the deployment of renewable-energy systems, energy-efficiency measures, and alternative vehicles among high-income families only. Yet, many state governments offer rays of hope for an alternative tax subsidy universe in which progressive climate-change tax subsidies are available to all families, regardless of income. The federal government and various state governments with more regressive subsidies should follow suit and reform their current climate-change subsidies to more progressive structures. Doing so would improve the cost-effectiveness and efficiency of existing programs, build broader political support for climate-change policies in the future, and assuage income inequality concerns. Until then, these governments will continue to add grains of truth to critics' piles—over a billion grains of truth each year.

213. *See Programs*, DSIRE N.C. CLEAN ENERGY TECH. CTR., http://programs.dsireusa.org/system/program?state=US [https://perma.cc/SJ72-ETC9] (last visited Mar. 3, 2017) (filter by "Program Type" and "Eligible Sector"). During my research, I discovered that the DSIRE database still lists some expired programs.